Optimum design of metal composites for closed die forging

ABSTRACT

In this paper, the application of commercial finite element software - ANSYS - has been used to model cold closed die forging process. The model has been developed using ANSYS Parametric Design Language (APDL) to simulate a single stage axi-symmetry closed die forging process for H cross sectional shape. The material used is AlMgSi matrix with 15%SiC particles, and its flow curve and fractural strain are obtained from the literature. Ansys Optimizer is used to obtain the maximum height that the material can flow in the rib by changing the design variables (DV) and the state variables (SV).Normally Design variables are geometrical parameters such as; rib height to width ratio, web height to rib height ratio, fillet radii, draft angle and billet radius. Optimization method called ñSub-Problem Approximation Methodò was used to find out the optimal design set. The technique used in this paper can be used for newly developed materials to investigate its forge ability for much complicated shapes in closed die forging process.

Keyword: Closed die forging; Forgebility; Metal matrix composite; Metal forming